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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: )  
Euan Skinner Macleod et al. )  
Serial No.: )  
Filed: )  
For: VACUUM CLEANER )

Examiner:

Art Unit:

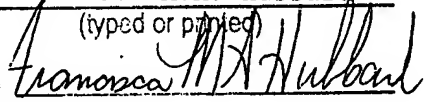
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TRANSMITTAL OF CERTIFIED COPY

Dear Sir:

We enclose herewith a certified copy of United Kingdom Patent Application No. 0307928.2 filed on April 5, 2003, on which applicants claim priority in the above referenced case.

Respectfully submitted,



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*Stephen Hordley*

Dated

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07APR03 E798165-2 002835  
P01/7700 0.00-0307928.2

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- 5 APR 2003

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1. Your reference	HE/P501145		
2. Patent application number (The Patent Office will fill in this part)	0307928.2		
3. Full name, address and postcode of the or of each applicant (underline all surnames)	Hoover Limited, Dragonparc, Abercanaid, Merthyr Tydfil, Mid Glamorgan, CF48 1PQ. United Kingdom  Patents ADP number (if you know it)  If the applicant is a corporate body, give the country/state of its incorporation		
	5942180001		
4. Title of the invention	Vacuum Cleaner		
5. Name of your agent (if you have one)	URQUHART-DYKES & LORD		
"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)	Three Trinity Court 21-27 Newport Road CARDIFF CF24 0AA		
Patents ADP number (if you know it)	1644025 ✓		
6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number	Country	Priority application number (if you know it)	Date of filing (day / month / year)
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a) any applicant named in part 3 is not an inventor, or b) there is an inventor who is not named as an applicant, or c) any named applicant is a corporate body. See note (d)			

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Claim(s)

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Request for preliminary examination and search (Patents Form 9/77)

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Any other documents (please specify)

11. I/We request the grant of a patent on the basis of this application.

Signature

Date

URQUHART-DYKES & LORD

04.04.03

12. Name and daytime telephone number of person to contact in the United Kingdom

Huw Evans

029 2048 7993

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## Vacuum Cleaner

This invention relates to a vacuum cleaner.

Vacuum cleaners conventionally comprise a permeable dust bag, which filters and retains the dirt and dust drawn into the vacuum cleaner by the induced air flow. Nowadays, it has become  
5 popular to provide vacuum cleaners, in which the separated dirt and dust is collected in a rigid dirt receptacle that can be emptied and re-used. Such so-called bagless cleaners alleviate the need to purchase and replace the dust bags. However, a disadvantage of re-usable dirt receptacles is that the  
10 receptacles are often dirty to handle and clouds of dirt and dust can be emitted into the atmosphere when the receptacles are emptied, with the obvious health risks and resultant contamination of the vacuum cleaner and the user's environment with a layer of dust.

15 Many bagless vacuum cleaners nowadays comprise a cyclonic separator, which deposits the separated dirt and dust in a rigid dirt receptacle. Cyclonic vacuum cleaners offer the advantage over bag-type cleaners of maintaining a more constant level of suction performance regardless of the quantity of dirt  
20 present in their dirt receptacle.

One of the main disadvantages of known cyclonic vacuum cleaners is that the procedure for emptying their dirt receptacles is a potentially dirty and unhygienic process. Instead of simply removing a closed paper bag full of dirt from  
25 the vacuum cleaner, and dropping it into a dustbin, emptying a cyclonic cleaner usually involves tipping a mass of loose dust and dirt out of its dirt receptacle, following removal of the receptacle from the cleaner. This emptying process can involve knocking and/or shaking the dirt receptacle to dislodge  
30 agglomerated dust and any masses of fibrous material, such as fluff and hairs that may be present.

This problem is exacerbated because fine dirt typically collects at the base of the dirt receptacle, with coarse and fibrous dirt lodging in the upper region of the receptacle.

When the dirt receptacle is inverted for emptying, the entire mass of dirt falls in an uncontrolled manner into the vessel used for its final disposal, typically a dustbin or refuse bag. This uncontrolled discharge usually results in the lighter dirt fractions being disturbed by the movement of the heavier fractions, whereupon the clothing and anatomy of the vacuum cleaner user may become contaminated with dust. The attendant escape of dust into the user's home environment is equally undesirable.

10 Many popular cyclonic vacuum cleaners have a simple cylindrical dirt receptacle, usually of transparent plastic material, which is removed from the cleaner and inverted over the dustbin for emptying. More recent cleaners have had a pivoted flap at the bottom of their dirt receptacle, this being  
15 released by some form of manually-operated latch to swing open for emptying under gravity or, in some cases, being spring-loaded to aid opening. In either case, dust and fibres suddenly fall out of the dirt receptacle when the flap opens. This flap-type emptying system exacerbates the problem of  
20 contamination, since the fine dust falls out of the bottom of the receptacle closely followed by the coarse and fibrous dirt, which falls through and/or lands on top of the fine dust causing clouds of fine dust to become airborne and contaminate the environment during the emptying process.

25 Thus, there is the need to provide a dirt receptacle for a cyclonic vacuum cleaner which is clean to use and does not generate clouds of dirt and dust when emptied.

EP 1 199 023 attempts to solve the above-mentioned problems by providing a cyclonic separator for a vacuum cleaner  
30 in which the lower region of the cylindrical dirt receptacle is separated from the upper region by a perforated disc-shaped partition. In use, the fine dust and dirt particles fall through the perforations in the disc and are retained in the region below the disc. The coarser particulate and fibrous  
35 material are retained above the disc. During emptying, the

lower region of the dirt receptacle can be opened and carefully emptied into a suitable waste receptacle for disposal. Having emptied the fine dust, the entire dirt receptacle containing the coarse and fibrous material, may then be inverted over the waste receptacle to complete the emptying process.

Although the dirt receptacle emptying arrangement disclosed in EP 1 199 023 constitutes a considerable improvement over the emptying arrangements of most commercially available cyclonic cleaners, the receptacle is complicated and expensive in construction and is difficult to use.

We have now devised a vacuum cleaner which alleviates the above-mentioned problems.

In accordance with this invention, as seen from a first aspect, there is provided a dirt receptacle for a vacuum cleaner, the receptacle comprising a rigid container having an outlet for the emptying of collected dirt, a closure for closing the outlet, the closure being moveable between a normally closed position and an open position, and means for retaining the closure in a partially opened position between said open and closed positions.

In use, the receptacle is emptied by initially moving the closure to its partially opened position, in which fine dirt and dust can be emptied through the restricted outlet in a controlled manner. The restricted size of the outlet retains any coarser and fibrous dirt inside the receptacle. Once the fine dirt has been emptied, the closure can be moved to its open position to allow the coarse dirt and fibrous matter to be emptied from the receptacle.

The present invention thus provides a clean and hygienic way of emptying the receptacle by allowing the fine and coarse dirt to be emptied in two distinct operating stages, thereby avoiding the problem of dust contamination when all of the dirt is released in an uncontrolled single stage.

The restricted size of the opening also allows a more controlled release of the fine dirt and avoids the problem of

dust contamination caused by a sudden release of the dirt.

The receptacle is simple and inexpensive in construction and is straightforward to use.

Preferably, the outlet is provided at a position on the  
5 container which is located at the bottom thereof when the container is in use, such that the outlet is positioned directly adjacent the fine dirt which collects at the bottom of the container.

Preferably, the container comprises an open bottom forming  
10 the outlet.

Preferably, the closure comprises a flap pivoted to the container.

Preferably an actuator is provided to move the closure between said open and closed positions.

15 Preferably the closure is lockable in said closed position.

Preferably the closure is biased into said fully open position.

In one embodiment, the actuator comprises a moveable  
20 member mounted to the container having an abutment surface which abuts a portion of the closure to constrain the latter against the applied bias, movement of the actuator permitting the closure to move between said closed and open positions via said partially open position under the applied bias.

25 Preferably, the actuator is slidably mounted to the container.

In an alternative embodiment, the closure comprises a pinion attached thereto and mounted for rotational movement about the rotational axis of the closure, the actuator  
30 comprises a pinion engaged with the closure pinion, such that rotational movement of the actuator causes rotational movement of the closure between said open and closed positions.

Also, in accordance with this invention as seen from a second aspect, there is provided a vacuum cleaner including a  
35 removable dirt receptacle comprising a rigid container having

an outlet for the emptying of collected dirt, a closure for closing the outlet, the closure being moveable between a normally closed position and an open position, and means for retaining the closure in a partially opened position between  
5 said open and closed positions.

Preferably the vacuum cleaner comprises a cyclonic separator having a cylindrical-walled separation chamber.

Also, in accordance with this invention as seen from a third aspect, there is provided a method of emptying a dirt  
10 receptacle of a vacuum cleaner, the receptacle comprising a rigid container having an outlet for the emptying of collected dirt, a closure for closing the outlet, the closure being moveable between a normally closed position and an open position, the method comprising removing the dirt receptacle  
15 from the vacuum cleaner, partially opening the closure and emptying fine dirt from the receptacle through the restricted outlet prior to fully opening the closure and emptying the remaining dirt from the receptacle.

As previously mentioned, vacuum cleaners are known which  
20 have had a pivoted flap at the bottom of their dirt receptacle, which can be released by some form of manually-operated latch to swing open for emptying under gravity or, in some cases, being spring-loaded to aid opening. A disadvantage of this arrangement is that, following emptying, the user has to touch  
25 the flap to push it closed by hand. It will be appreciated that this is undesirable since the surface of the flap is contaminated with dirt and dust.

Thus, in accordance with this invention as seen from a fourth aspect, there is provided a dirt receptacle for a vacuum  
30 cleaner, the receptacle comprising a rigid container having an outlet for the emptying of collected dirt, a closure for closing the outlet and an actuator for moving the closure from an open position to a closed position.

The actuator therefore enables the closure to be closed  
35 without having to touch the closure.

Preferably the actuator is located away from the outlet, so that it does not become contaminated with dirt and dust during emptying.

Preferably the actuator is provided on an external wall  
5 of the container.

Preferably the closure comprises a flap which is pivotally mounted to the container.

Preferably the actuator engages the flap adjacent the point at which the flap is pivoted to the container.

10       Embodiments of this invention will now be described by way of examples only and with reference to the accompanying drawings, in which:

Figure 1 is a schematic view of a vacuum cleaner in accordance with this invention;

15       Figure 2 is a perspective view of a dirt collection bin of the cleaner of Figure 1, showing the discharge flap thereof in its closed state;

Figure 3 is a side view of the dirt collection bin of the cleaner of Figure 1, showing the discharge flap thereof in its  
20 closed state;

Figure 4 is a perspective view of a dirt collection bin of the cleaner of Figure 1, showing the discharge flap thereof in its partially opened state;

Figure 5 is a side view of the dirt collection bin of the  
25 cleaner of Figure 1, showing the discharge flap thereof in its partially opened state;

Figure 6 is a perspective view of a dirt collection bin of the cleaner of Figure 1, showing the discharge flap thereof in its fully opened state;

30       Figure 7 is a side view of the dirt collection bin of the cleaner of Figure 1, showing the discharge flap thereof in its fully opened state;

Figure 8 is a perspective view of a dirt collection bin of an alternative embodiment of vacuum cleaner in accordance  
35 with this invention;, showing the discharge flap thereof in its

closed state; and

Figure 9 is a perspective view of the dirt collection bin of Figure 8, showing the discharge flap thereof in its fully opened state.

5 Referring to Figure 1 of the drawings, there is shown an upright vacuum cleaner comprising a wheeled suction head 10, to which a body portion 11 is pivoted for movement between an upright position and an inclined operative position. A motor and fan are mounted in a bottom portion 12 of the body 11 of  
10 the cleaner.

A separation unit 13 mounted in the body 11 of the cleaner comprises a cyclone separator and a filter. In use, the fan induces an airflow through the cleaner from the suction head 10 through the separation unit 13, where dirt and dust  
15 separated from the airflow by the cyclone is collected in a removable dirt collection bin 14 mounted directly below the separation unit 13. The cyclone separator comprises a cylindrical wall and for practical purposes, the side wall of the collection bin 14 is a downward extension of the wall of  
20 the cyclone.

The cyclonic separation action causes the finer dirt particles F to collect at the bottom of the collection bin 14 below the coarser dirt particles and fibrous matter C.

Referring to Figures 2 and 3 of the drawings, the  
25 collection bin 14 comprises a cylindrical side wall 15 having an open top which communicates with the cyclone separator. The bottom of the bin 14 is closed by a flap 16 which is pivoted by a shaft to the side wall 15 of the bin 14 for rotation about an axis which extends perpendicular to the longitudinal axis  
30 of the bin. A torsion spring 17 biases the flap 16 downwardly into a position where the bottom of the bin 14 is fully open.

The flap 16 comprises a pair of spaced-apart formations 18, between which the above-mentioned shaft extends. Each formation 18 comprises an outwardly facing abutment surface  
35 which lies in a plane that extends parallel to both the

longitudinal axis of the bin and rotational axis of the flap 16, when the later is in its fully closed position.

5 An actuator 19 is slidably mounted to the outer surface of the side wall 15 of the bin 14 for movement in a direction which extends parallel to the longitudinal axis of the bin. The actuator 19 comprises a pair of arms having lower ends which abut the respective flap formations 18.

10 A foldable handle 20 is attached to the arms of the actuator 19 for sliding the actuator 19 in the upward and downward directions shown in the drawings. In its fully downward position, the bottom ends of the arms of the actuator 19 bear against the abutment surface of the flap formations 18, thereby holding the flap in its closed position and preventing the collected dirt and dust from falling out of the bottom of  
15 the bin 14 whilst the cleaner is in use and whilst the bin 14 is being carried to a waste receptacle for emptying. The handle 20 also serves as a handle for supporting the bin 14 whilst it is being carried.

Referring to Figures 4 and 5 of the drawings, in order to  
20 empty the bin 14, the user slides the actuator 19 upwardly using the handle 20, thereby allowing the flap 16 to open under the spring bias, until the bottom ends of the arms of the actuator 19 engage in respective detents 21 formed in the abutment surfaces of the flap formations 18. In this position,  
25 the flap 16 is retained in the partially open position and the fine dirt and dust F at the bottom of the bin 14 can be emptied through the small opening at the bottom of the bin 14. Any coarse dirt and fibrous matter C cannot pass through the opening and is retained inside the bin 14.

30 Referring to Figures 6 and 7 of the drawings, in order to fully empty the bin 14, the user has to slide the actuator 19 more upwardly using handle 20, thereby allowing the flap 16 to fully open under the applied spring bias. In this position, all of the remaining dirt and dust inside the bin 14 is free to  
35 fall through the open bottom of the bin 14.



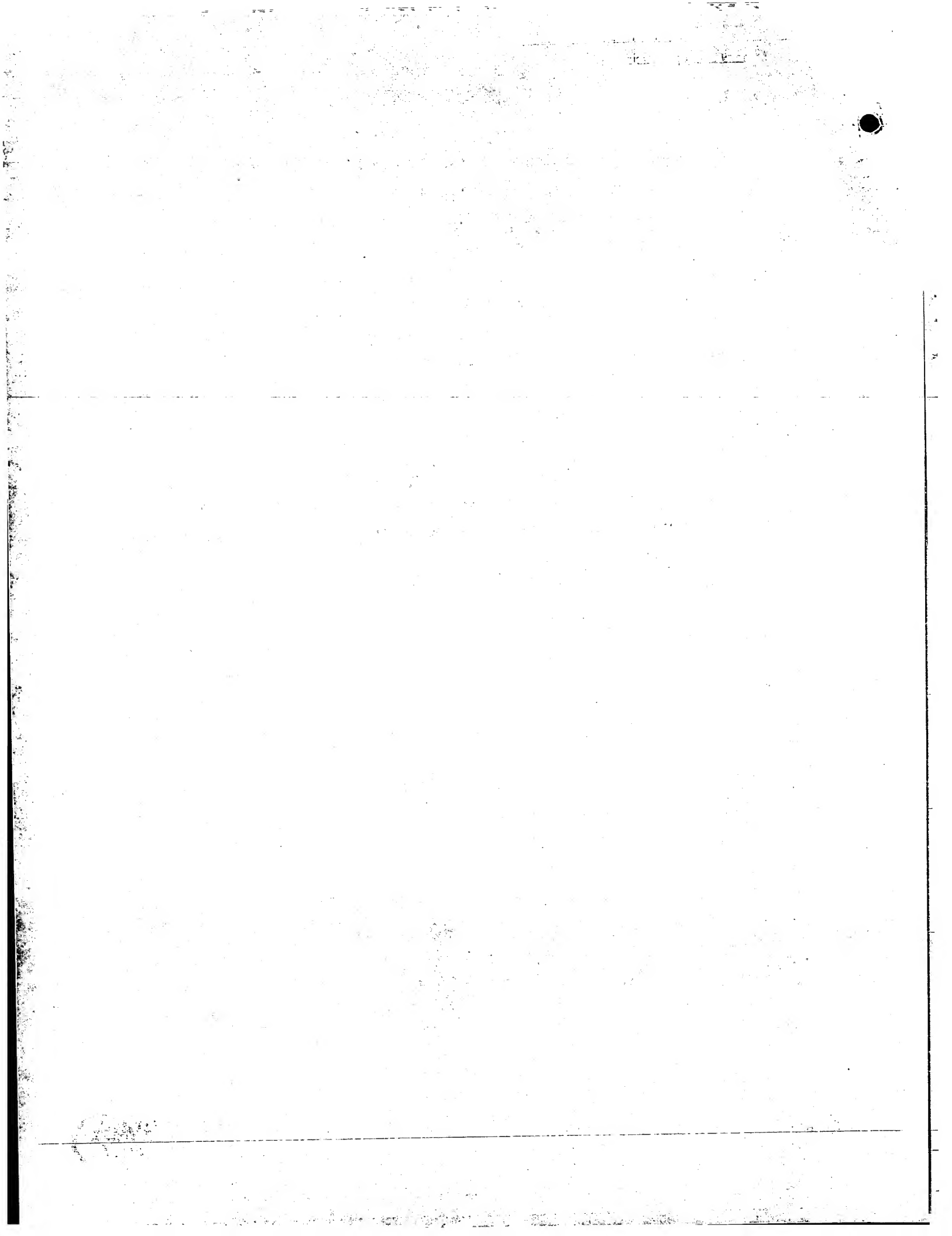
Following emptying of the bin 14, the actuator 19 is returned to its lower position using the handle 20, thereby closing the flap 16 against the spring bias. The body 11 of the cleaner is preferably adapted such that the bin 14 cannot be  
5 mounted to the cleaner until the actuator 19 has been returned to the lower position, thereby avoiding the risk of the flap 16 opening whilst the bin 14 is removed from the cleaner.

The upper surface of the flap 16 is contaminated with dirt and dust. However, it will be appreciated that actuator 19  
10 enables the user to open and close the flap 16 without having to touch the flap itself.

Referring to Figures 8 and 9 of the drawings, there is shown an alternative embodiment of a bin 14, which is similar to the above-mentioned bin and like parts are given like  
15 reference numerals. In this embodiment, a pair of pinions 42 are mounted to the flap 16 for rotation about the rotational axis of the flap 16. A handle 40 is pivotally mounted to the external surface of the wall 15 of the bin 14 for rotation about an axis which extends parallel to the axis of flap  
20 rotation. A second pair of pinions 41 are mounted to the handle 40 and are engaged with respective ones of the flap pinions 42.

In order to open the flap 16, the handle 40 is rotated about its rotational axis, causing the pinions 41 to correspondingly turn the flap pinions 42. A detent (not shown)  
25 is provided to retain the flap 16 in its partially opened position and to provide a tactile indication to the user that the flap 16 is in the correct position for the emptying of fine dirt.

The bin of the present invention is simple and inexpensive  
30 in construction, yet allows a staged discharge of fine and course dirt, thereby minimising the risks of dust contamination during emptying.



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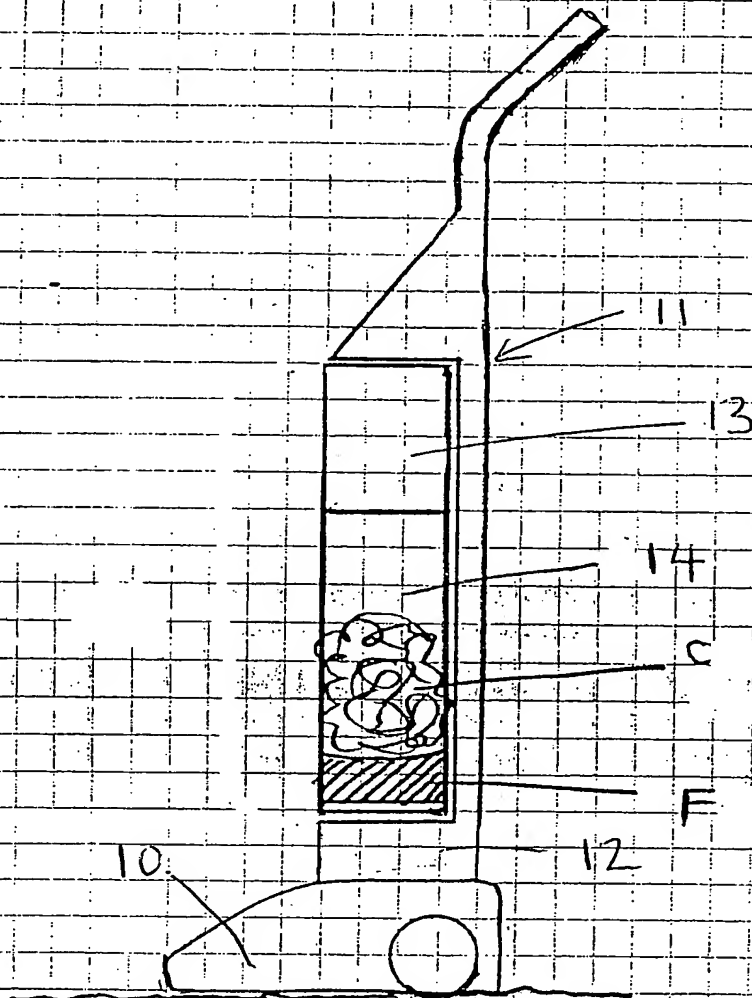


Figure 1

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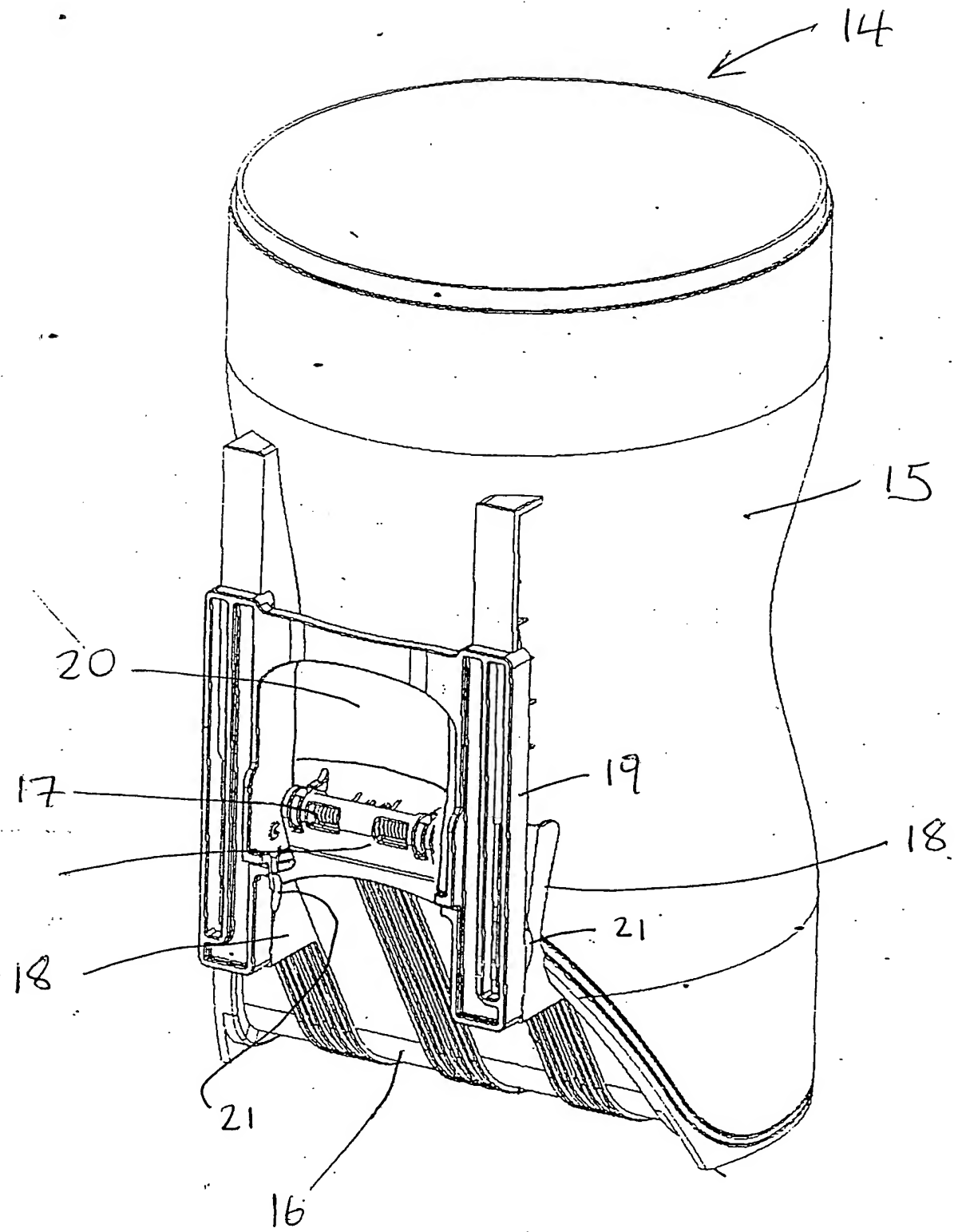


Figure 7

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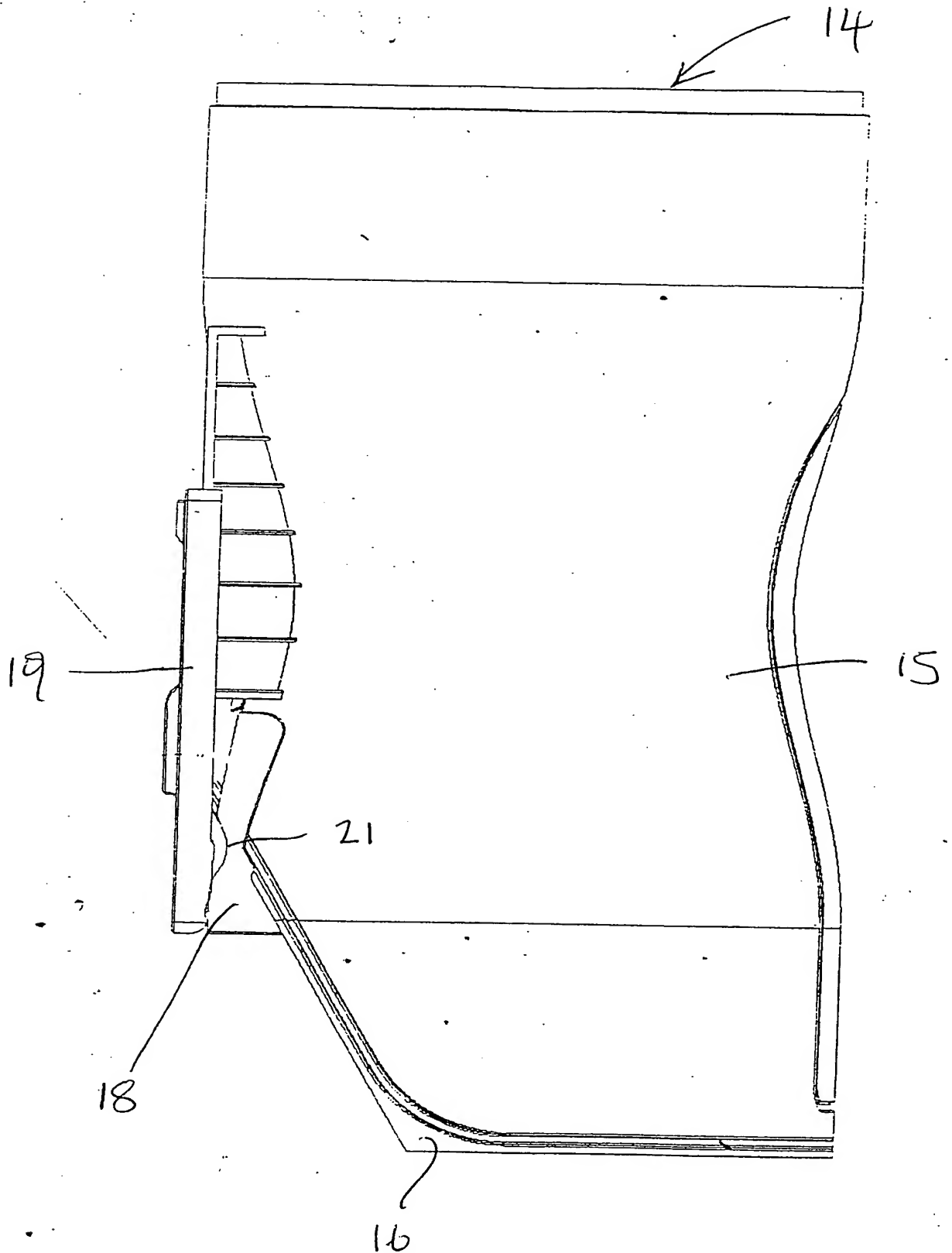


Figure 3

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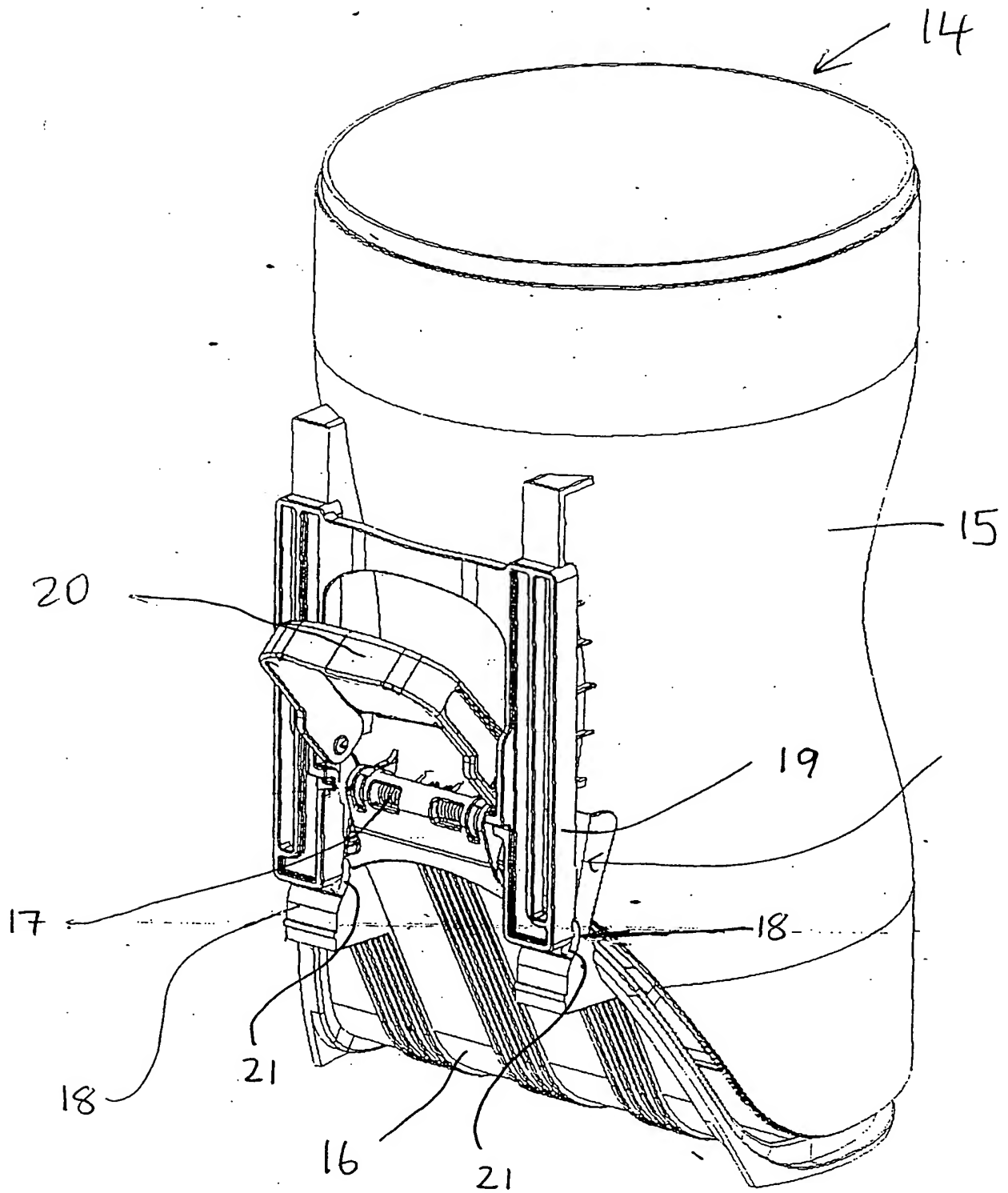


Figure 4

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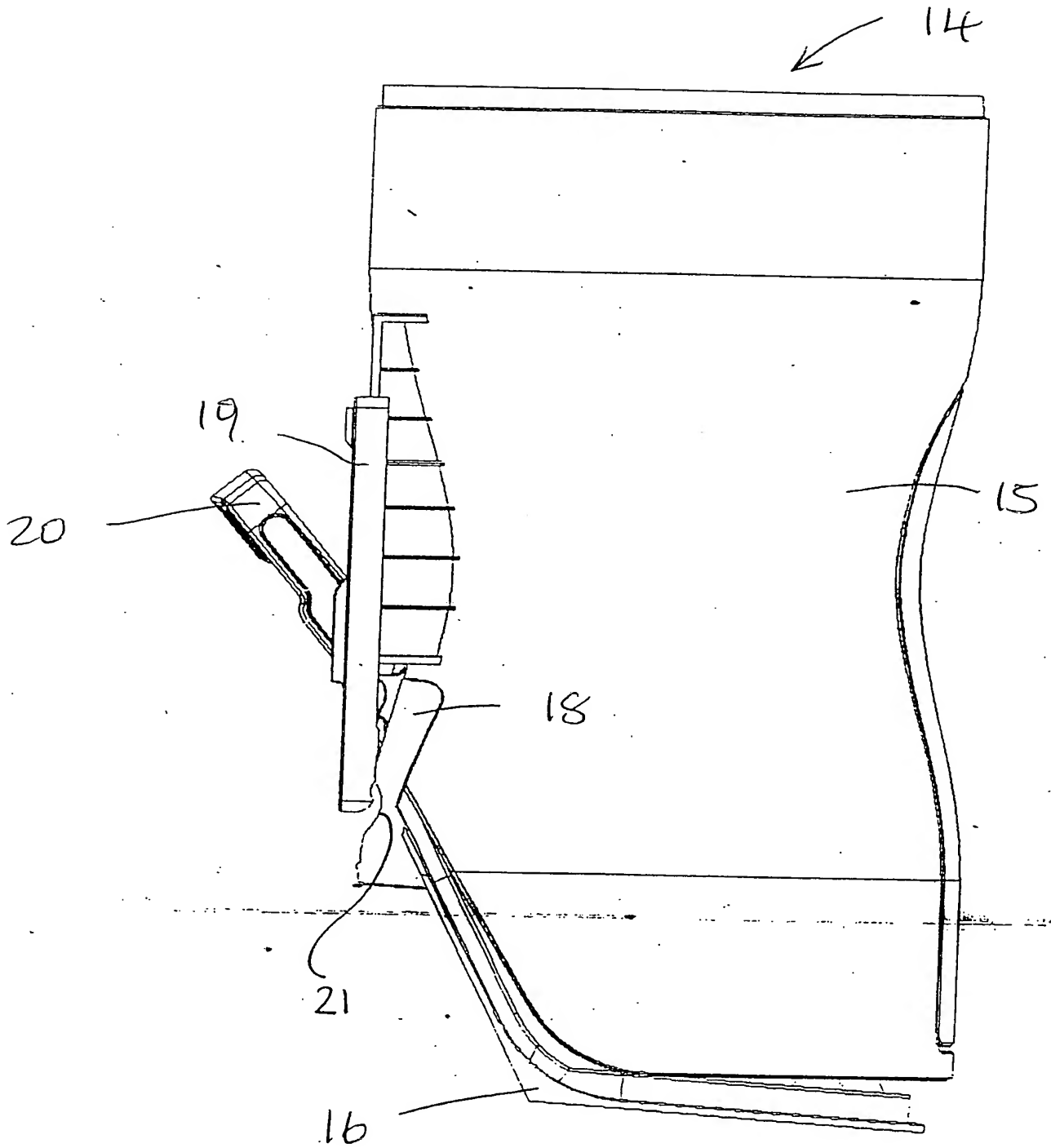


FIGURE 5

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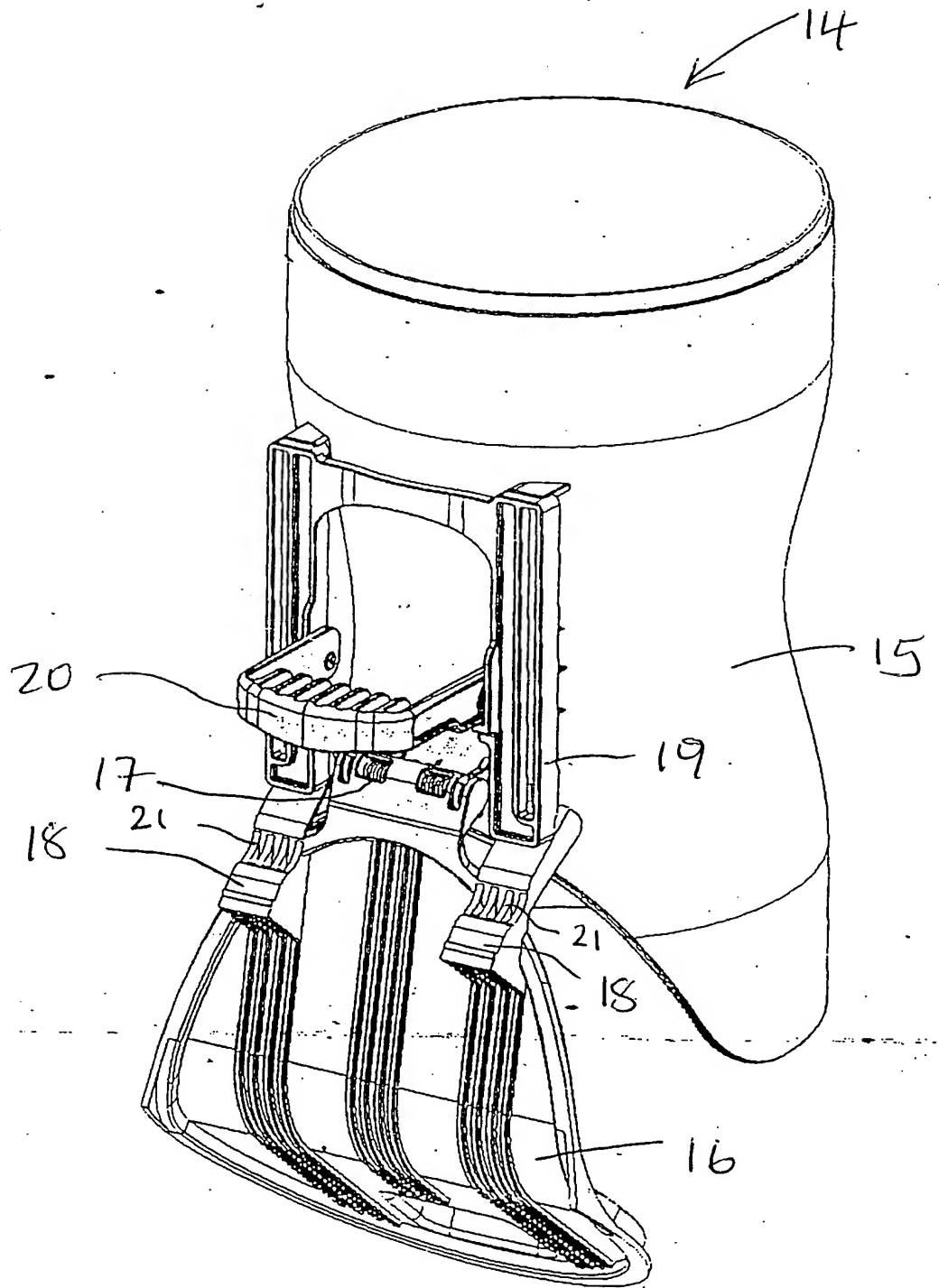


FIGURE 6

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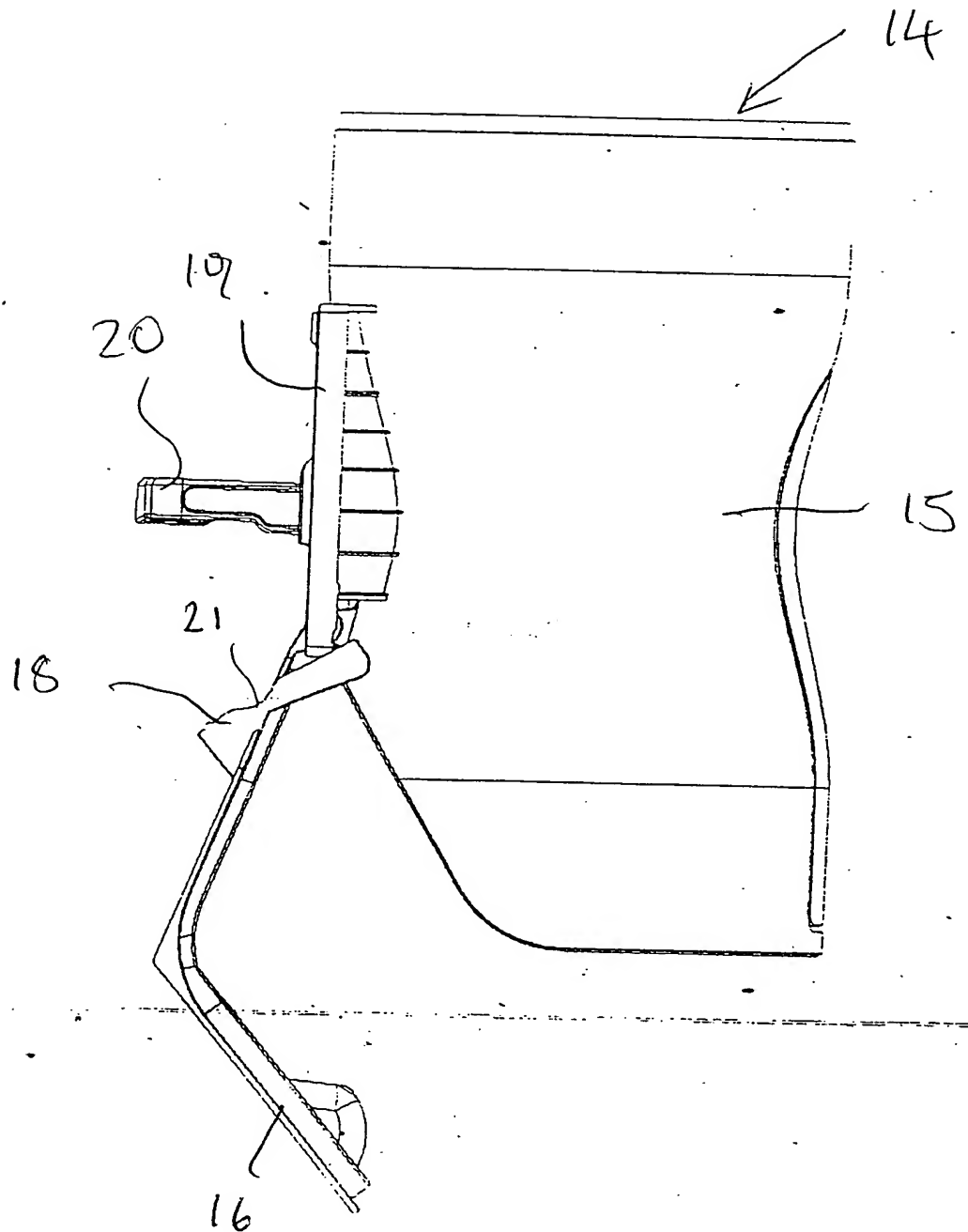


FIGURE 7

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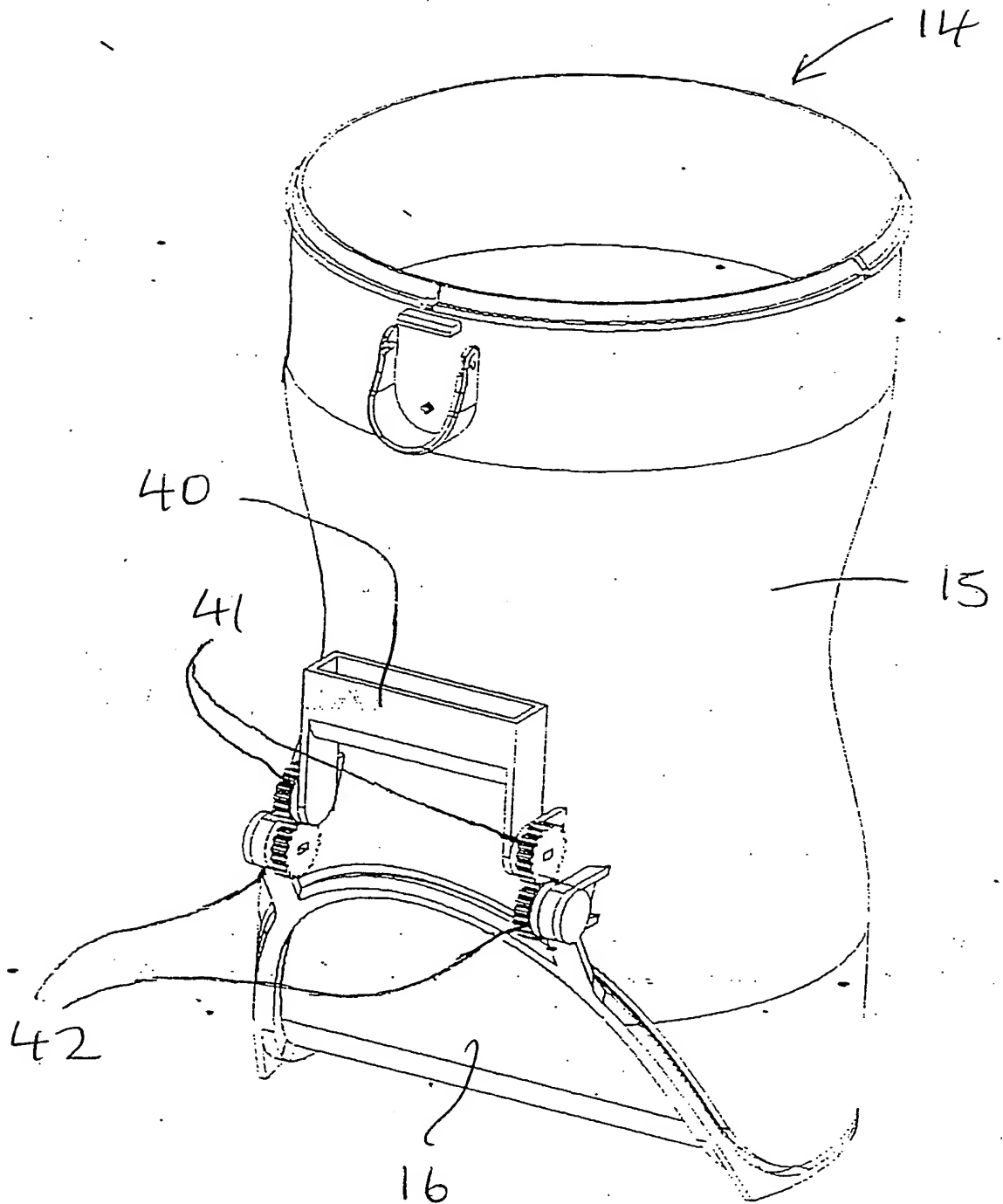


FIGURE 8

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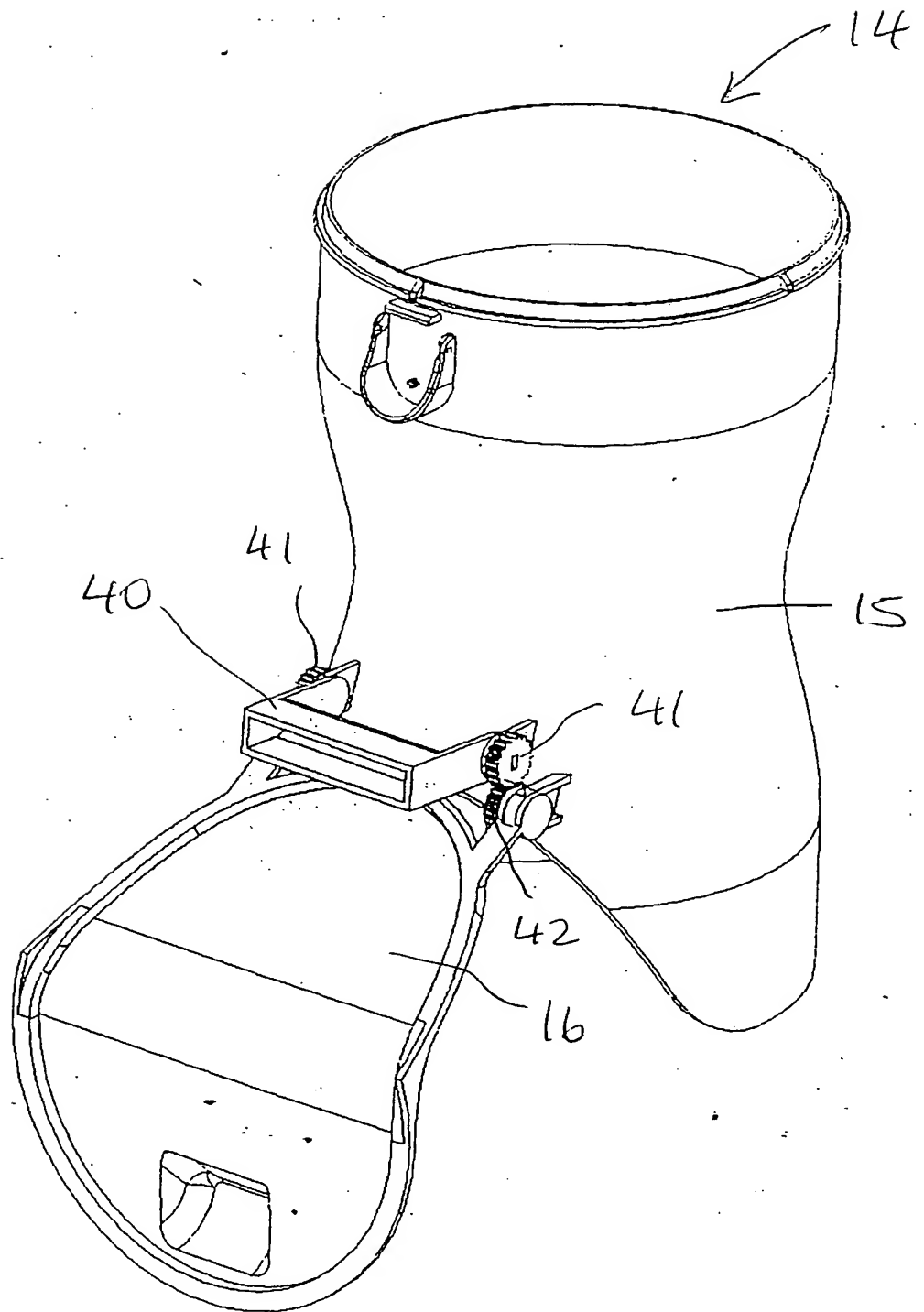


FIGURE 9

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